

S/N 09/746,620  
Attorney Docket 12008.21USC1  
Amendment & Response

**In the Claims**

Please cancel claims 6-7, 12-32, 36 and 49-52.

Please amend claims 1-5, 8-9, 33, 37, 40 and 45 as follows:

Add new claims 53-56.

Claim 1. (Currently Amended) A An array comprising a plurality of electrically isolated nucleic acid sensor sensors on a substrate for detecting target nucleic acid, ~~the~~ each nucleic acid sensor comprising:

- a) an electrode;
- b) redox polymer disposed on the electrode;
- c) enzyme disposed on the electrode; and
- d) a an electrophoretically deposited sensor nucleic acid coupled to the redox polymer,

wherein, in the presence of a substrate, the enzyme generates a detection compound, and wherein binding of the sensor nucleic acid to the target nucleic acid results in an increased rate of oxidation or reduction of the detection compound.

Claim 2. (Currently Amended) The array nucleic acid sensor according to claim 1 wherein the redox polymer of each nucleic acid sensor comprises a redox hydrogel.

Claim 3. (Currently Amended) The array nucleic acid sensor according to claim 1 wherein the enzyme of each nucleic acid sensor is immobilized in the redox polymer.

Claim 4. (Currently Amended) The array nucleic acid sensor according to claim 1 wherein the enzyme of each nucleic acid sensor generates hydrogen peroxide as the detection compound.

Claim 5. (Currently Amended) The array nucleic acid sensor according to claim 1 wherein the enzyme of each nucleic acid sensor is choline oxidase, hydroxylase, or hydrolase.

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Claims 6-7. Canceled.

Claim 8. (Currently Amended) The array according to claim 7 1 wherein the sensor nucleic acids of at least two of the nucleic acid sensors are different.

Claim 9. (Currently Amended) An array comprising:

a) a plurality of electrically isolated nucleic acid sensors, each nucleic acid sensor comprising:

- (i) an electrode;
- (ii) redox polymer disposed on the electrode;
- (iii) enzyme disposed on the electrode; and
- (iv) a an electrophoretically deposited sensor nucleic acid coupled to the redox

polymer; and

b) one or more flow channels disposed on the array, each flow channel having a width of 200  $\mu\text{m}$  or less,

wherein, in the presence of a substrate, the enzyme generates a detection compound, and wherein binding of the sensor nucleic acid to the target nucleic acid results in an increased rate of oxidation or reduction of the detection compound.

Claim 10. The array according to claim 9 wherein the enzyme is immobilized in the redox polymer.

Claim 11. The array according to claim 9 wherein the sensor nucleic acids of at least two of the nucleic acid sensors are different.

Claims 12-32. Canceled.

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Claim 33. (Currently Amended) A kit for detecting target nucleic acid comprising:  
a) a plurality of electrically isolated nucleic acid sensors, at least one a nucleic acid sensor comprising:  
(i) an electrode;  
(ii) redox polymer disposed on the electrode;  
(iii) enzyme, wherein, in the presence of a substrate, the enzyme generates a detection compound; and  
(iv) a an electrophoretically deposited sensor nucleic acid coupled to the redox polymer; and  
b) a probe nucleic acid, wherein the probe nucleic acid is coupled to a catalyst, wherein the catalyst catalyzes an electrochemical reaction of the detection compound upon hybridization of the sensor nucleic acid and the probe nucleic acid to the target nucleic acid.

Claim 34. The kit according to claim 33 wherein the enzyme is disposed on the electrode.

Claim 35. The kit according to claim 34 wherein the enzyme is immobilized in the redox polymer.

Claim 36. Canceled.

Claim 37. (Currently Amended) The kit according to claim ~~36~~ 33 wherein each nucleic acid sensor comprises:

a) an electrode;  
b) redox polymer disposed on the electrode;  
c) enzyme, wherein, in the presence of a substrate, the enzyme generates a detection compound; and

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d) a an electrophoretically deposited sensor nucleic acid coupled to the redox polymer.

Claim 38. The kit according to claim 37 wherein the enzyme is disposed on the electrode.

Claim 39. The kit according to claim 38 wherein the enzyme is immobilized in the redox polymer.

Claim 40. (Currently Amended) The kit according to claim ~~36~~ 37 wherein the sensor nucleic acid of at least two of the nucleic acid sensors are different.

Claim 41. The kit according to claim 33 wherein the catalyst coupled to the probe nucleic acid comprises a thermostable enzyme.

Claim 42. The kit according to claim 33 wherein the catalyst is peroxidase, glucose oxidase, glucose dehydrogenase, lactose oxidase, or lactose dehydrogenase.

Claim 43. The kit according to claim 33 further comprising a substrate for the enzyme.

Claim 44. The kit according to claim 43 wherein the substrate is hydrogen peroxide, glucose, or choline.

Claim 45. (Currently Amended) A kit for detecting target nucleic acid comprising:

a) a nucleic acid sensor comprising:

(i) an electrode;

(ii) redox polymer disposed on the electrode; and

(iii) a an electrophoretically deposited sensor nucleic acid coupled to the redox polymer; and

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b) a probe nucleic acid, wherein the probe nucleic acid is coupled to a thermostable enzyme,

wherein the thermostable enzyme catalyzes an electrochemical reaction of a detection compound upon hybridization of the sensor nucleic acid and the probe nucleic acid to the target nucleic acid.

Claim 46. The kit according to claim 45 wherein the nucleic acid sensor further comprises an enzyme, wherein, in the presence of a substrate, the enzyme generates the detection compound.

Claim 47. The kit according to claim 46 wherein the enzyme is disposed on the electrode.

Claim 48. The kit according to claim 47 wherein the enzyme is immobilized in the redox polymer.

Claims 49-52. Canceled.

Claim 53. (New) An array comprising:

a) a plurality of electrically isolated nucleic acid sensors, each nucleic acid sensor comprising:

- (i) an electrode about 1-10 micrometers in diameter;
- (ii) redox polymer disposed on the electrode;
- (iii) enzyme immobilized in the redox polymer and disposed on the electrode; and
- (iv) an electrophoretically deposited sensor nucleic acid coupled to the redox

polymer, wherein the sensor nucleic acids of at least two sensors are different; and

b) one or more flow channels disposed on the array, each flow channel having a width of 200  $\mu\text{m}$  or less,

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wherein, in the presence of a substrate, the enzyme generates a detection compound, and wherein binding of the sensor nucleic acid to the target nucleic acid results in an increased rate of oxidation or reduction of the detection compound.

Claim 54. (New) An array comprising a plurality of electrically isolated nucleic acid sensors on a substrate for detecting target nucleic acid, each nucleic acid sensor comprising:

- a) a microelectrode;
- b) redox polymer disposed on the electrode;
- c) enzyme immobilized in the redox polymer and disposed on the electrode, the enzyme being choline oxidase, hydroxylase, or hydrolase; and
- d) an electrophoretically deposited sensor nucleic acid coupled to the redox polymer, the sensor nucleic acids of at least two of the nucleic acid sensors being different,

wherein, in the presence of a substrate, the enzyme generates a detection compound, and wherein binding of the sensor nucleic acid to the target nucleic acid results in an increased rate of oxidation or reduction of the detection compound.

Claim 55. (New) A kit for detecting target nucleic acid comprising:

- a) a plurality of electrically isolated nucleic acid sensors, at least one a nucleic acid sensor comprising:

- (i) an electrode;
- (ii) redox polymer disposed on the electrode;
- (iii) enzyme immobilized in the redox polymer and disposed on the electrode,

wherein, in the presence of a substrate, the enzyme generates a detection compound; and

- (iv) a an electrophoretically deposited sensor nucleic acid coupled to the redox polymer, the sensor nucleic acid of at least two of the nucleic acid sensors are different; and
- b) a probe nucleic acid, wherein the probe nucleic acid is coupled to a catalyst,

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wherein the catalyst catalyzes an electrochemical reaction of the detection compound upon hybridization of the sensor nucleic acid and the probe nucleic acid to the target nucleic acid.

Claim 56. (New) An array comprising:

a) a plurality of electrically isolated nucleic acid sensors, each nucleic acid sensor comprising:

- (i) an electrode;
- (ii) redox polymer electrophoretically deposited on the electrode;
- (iii) enzyme immobilized in the redox polymer and disposed on the electrode; and
- (iv) an electrophoretically deposited sensor nucleic acid coupled to the redox

polymer, wherein the sensor nucleic acids of at least two sensors are different; and

b) one or more flow channels disposed on the array, each flow channel having a width of 200  $\mu\text{m}$  or less,

wherein, in the presence of a substrate, the enzyme generates a detection compound, and wherein binding of the sensor nucleic acid to the target nucleic acid results in an increased rate of oxidation or reduction of the detection compound.